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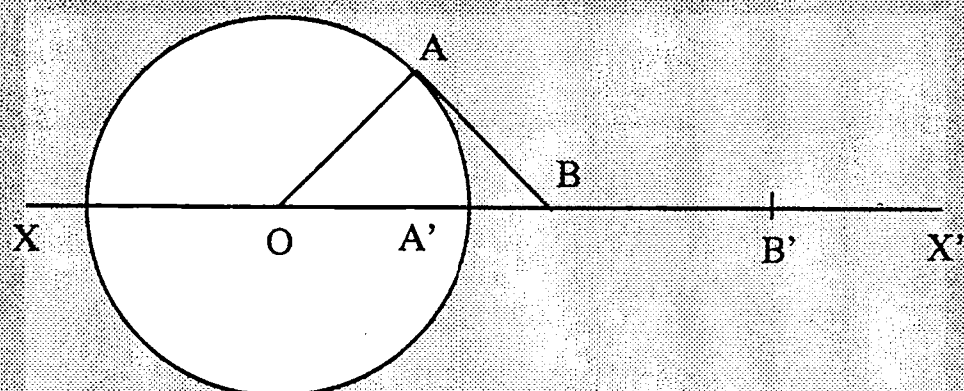

Reciprocity

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A NEW DERIVATION OF PLANCK'S CONSTANT

To present-day physical science the numerical value of Planck's constant is a mystery: quantum mechanics does not have a theoretical method for its calculation. By contrast the Reciprocal System of theory derives the value of all physical constants, including Planck's constant, from its fundamental postulates. However, because of errors in the previous derivations, this paper presents a new, dimensionally sound method for the calculation.

Larson[1] was the first to attempt to derive Planck's constant from the Reciprocal System. Because of the change in the calculated natural values of mass and energy in the second edition of his work[2], the original derivation has been invalidated. The factor of three that was used is dimensionally incorrect since the photon is a one-dimensional vibration. And the use of the cgs gravitational constant in such an equation is wrong since the result cannot be converted to a different system of units such as the SI (mks) system. The remainder of Larson's original equation (including the use of the interregional ratio and the square of the natural unit of time) will be shown to be correct.

Nehru[3] made the second attempt to calculate the constant. However, he started by setting the dimensions of energy to be space divided by time, which is, of course, the reverse of what they are. The rest of the derivation was very tortuous, although he ended up with a good numerical result (with faulty dimensions).

Let us now proceed with the new derivation. First, consider conceptually the linear vibration of the photon. The oscillation takes place over one space unit—which, simultaneously, is also one time unit. In the material sector of the universe, we define frequency to be cycles/sec, because here it is time that appears to have a uniform progression; in the cosmic sector of the universe, hypothetical cosmic observers would define frequency to be cycles/cm (or some such length unit), because there it is space that would appear to have a uniform progression. Actually, the photon exists at the boundary between the two sectors, where both space and time progress uniformly. Here the correct, nAtural definition of frequency must be cycles/(cm-sec) (or equivalent units). To put it another way, frequency in the natural sense is the number of cycles per *space-time* unit. Photons of all frequencies can be observed in both sectors, and the only way that this could be possible is if the denominator of the natural definition contains both a space unit and a time unit. This then causes Planck's constant to have the *actual* dimensions of erg-cm-sec. However, if the dimensions of frequency are assumed to be cycles/sec, rather than cycles/(cm-sec), then the dimensions of Planck's constant are erg-sec.

Let E be photon energy, h be Planck's constant, and √ be photon frequency. Then, as usual, we have

$$E = h * \surd \qquad (1)$$

In space-time terms, equation (l) is

$$\frac{t}{s} = \left[\frac{t^2}{\left(\frac{t/s}{t/s}\right)}\right]\frac{1}{s * t} \qquad (2)$$

In the cgs system of units, equation (l) is

$$erg = \left[\frac{sec^2}{\left(\frac{sec/cm}{erg}\right)}\right]\frac{1}{cm * sec} \qquad (3)$$

Observe, in both cases, the dimensional consistency.

Since the oscillation of the photon takes place within a unit of space-time, the interregional ratio must be contained within Planck's constant. With this factor and the dimensional information from above, Planck's constant is

$$h = \frac{1}{156.4444} * \frac{t_o^2}{\left(\frac{sec/cm}{erg}\right)} \qquad (4)$$

where t is the natural unit of time ($1.520655 * 10^{-16}$ sec).

Ref. 3 states that the ratio of (sec/cm)/erg is 2.236055×10^{-8}. This figure is deduced as follows. Dimensionally unit mass is t^3/s^3, or $3.711381 * 10^{-32}$ sec^3/cm^3. Avogadro's constant is the number of atoms per gram atomic weight. $6.02486 * 10^{-23}$. The reciprocal of this number, $1.65979 * 10^{-24}$, in grams, is therefore the mass equivalent of unit atomic weight[2]. Thus to convert from the unit sec^3/cm^3 to grams we must divide by $2.236055 * 10^{-8}$. From the expression $E = mc^2$ we see that the *same* conversion factor must apply to energy (in ergs) to keep the equation balanced. (Nehru[3] modified his equation to include secondary mass; however, his resulting equation is dimensionally incorrect. Furthermore, secondary mass varies between the subatoms and atoms and so cannot be a part of the conversion factor). Thus the numerical value of Planck's constant is

$$h = 6.6102652 \times 10^{-27} \text{erg-sec} \qquad (5)$$

(when frequency is assumed to have the dimensions cycles/sec).

This is 99.77% of the experimental value of $6.6256 * 10^{-27}$ erg-sec. Given the uncertainties involved in the determination of Avogadro's constant and the natural unit of time, the result is satisfactory. Any improvement in the accuracy of these values would be reflected in an improvement in the accuracy of the calculation of Planck's constant.

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—Ronald W. Satz

THE "ARROW OF TIME"

From the mathematical standpoint, the quantity that enters into such relations as the equations of motion can be either positive or negative, and the fact that time is observed to move only in one direction is frequently characterized as an anomaly, a "puzzle." But there is nothing puzzling about the direction of time if it is viewed in *physical* terms. Time, as a physical quantity—the time interval between two events, for instance—cannot be less than zero. The net magnitude of a quantity of time is therefore positive in all cases. The physical arrow points forward.

A related issue that remains unresolved in the present-day mathematical version of physical theory is the question as to why time has the characteristics of a continual flow. Paul Davies describes the situation in this manner:

> It is one of the most perplexing puzzles in physics that the elementary conscious experience of time—the flow or motion of the present moment—is absent from the physicist's description of the objective world.

The truth is that the physicists are not entitled to expect that their theories, which *compensate for* the errors in their basic premises by more complex mathematics, rather than *correcting* the errors, will answer the *physical* questions. For these answers we need to go beyond the mathematical relations and examine the physical aspects of the phenomena under consideration. This is what has been done in the development of the theory of the universe of motion. When time is examined in the light of the new information derived from this theory, we find that its "flow" is due to a motion of our reference system relative to the natural reference system, the system to which the universe actually conforms.

–Dewey B. Larson

The forthcoming issue of ISUS News will carry full coverage of the 14th annual ISUS conference, held in Portland, Oregon Aug 12-14, 1989.

THE LAW OF CONSERVATION OF DIRECTION

Introduction

Some students of the Reciprocal System (RS) have been disputing the explanation of the intrinsic structure of the photons, given by Larson, the originator of the R.S. No amount of discussion, so far, seemed to throw additional light in overcoming the logical objections raised. An examination of the situation undertaken by the present investigator revealed that a crucial fact of fundamental nature is being missed hitherto, both by the originator and the other students. It is found that a recognition of this fact not only clarifies the photon situation entirely but also throws light on many collateral issues where gaps in the logical development of the theory exist, thus rendering the theory more cogent. Some of these new developments are reported in this Paper.

The Difficulties with Larson's Account of the SHM

In the outline of the deductive development of his theory Larson states:

"The continuity of the progression within the units enables the existence of another type of scalar motion of physical locations. This is a motion in which there is a continuous and uniform change from outward to inward and vice versa; that is, a *simple harmonic motion*."[1] A little earlier (item 5 of the Ref. cited) he defines "outward" and "inward" as being the scalar directions and representing motion away from and toward a reference point in the stationary three-dimensional spatial reference system respectively. The former results in increasing intervening distance while the latter in decreasing intervening distance.

Since there is nothing like more outward (inward) or less outward (inward) the question arises as to the meaning of the statement "a continuous and uniform change from outward to inward"? Outward and inward, as applied to scalar motion, are *discrete* directions: the scalar motion could be *either* outward *or* inward. There are no intermediate possibilities. Larson is quite clear about this, at another juncture: "When the progression within a unit of motion reaches the end of the unit it either reverses or does not reverse. There are no intermediate possibility."[2] As such, the idea of a "constant and uniform change" is logically incompatible with, this concept of "outward-inward motion." It must be remembered that the *magnitude* of the motion is constant, being unity.

Since simple harmonic motion (SHM) does seem to underlie the structure of photons, the crux of the problem of understanding the nature of the photon is the explanation of the genesis of the SHM given only uniform scalar speed. If a vibration of the type Larson proposes is to exist, it can not be a SHM. The speed has to be a square wave. SHM seems possible only if one of the components (space or time) progresses non-uniformly while the other progresses uniformly. In fact, SHM will be the result under the two circumstances: (i) when a *constant magnitude* is continuously and uniformly changing its *direction* in the conventional rcference system (as in rotation) and its *projection* in a constant direction is being considered; or (ii) when there is a *constant direction* and the magnitude is continuously and *non-uniformly* changing. The second alternative is precluded by definition (see item D of the Basic Principles in the "Outline"[3]).

Is Rotation Primary ?

A scalar motion has magnitude only, and no inherent spatial direction. It therefore has to be given a direction in order to be represented in a spatial reference system. Now a "constant and uniform change" envisaged by Larson can only happen if the representation in the reference system changes the vectorial direction uniformly as in rotation. As a matter of fact, SHM will be the result if two such rotations, mutually opposite in direction, are vectorially combined.

But Larson does not posit the possibility of rotation prior to the existence of photons. Thus he states: "While motion is possible without anything moving, rotation is not possible unless some physical object is available to be rotated."[4] The logical basis for this conclusion is hard to find. Rotation is as much a motion as translation is, and logically it must be as much possible without any "thing" rotating, as far as the primary motions are concerned. One wonders, in this context, if the author is completely free of the unconscious leanings to the frame of mind that underlies the view of the universe of matter as against the universe of motion!

Rotation is precluded only if space is one-dimensional. Just as soon as it is established that the stationary spatial reference system is three-dimensional, rotation becomes a possibility. Larson himself, while discussing the status of the uncharged electron, refers to the general nature of space which includes rotation as much as linear translation. "Thus the electron is essentially nothing more than a rotating unit of space. This is a concept that is rather difficult for most of us when it is first encountered, because it conflicts with the idea of the nature of space that we have gained from a long-continued, but uncritical, examination of our surroundings. ... The "space" of our ordinary experience, extension space, ... is merely one manifestation of space in general ..."[6]. Therefore, what is not being explicitly recognized is that, in general, space has two intrinsic traits: translational and rotational.

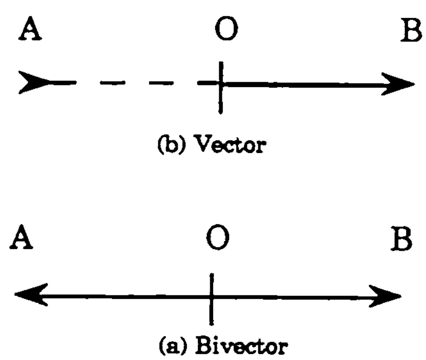
The translational trait manifests to us as the familiar "extension space," whereas the rotational trait—which manifests as difference in directions—is not so readily regarded by common experience as manifestation of space. Hence the representation of a uniform scalar motion in the conventional reference system can take either the form a uniform and continuous change of linear magnitude with a constant direction, or the form of a uniform and continuous change of direction, with a constant linear magnitude, that is, a rotation.

Conservation of Direction

As already pointed out, a scalar motion does not have a vectorial direction. The latter is a property acquired due to the *coupling* with the conventional stationary three-dimensional spatial reference system, which involves also the identification of a reference point. A point of universal significance that needs to be recognized is that *the representation of a scalar motion in the conventional reference system conserves direction.* This is accomplished by the representation by substituting two opposite directions—what we will call a "bidirection"—for the original lack of direction.

For example, consider the motion of a point 0 that is made the reference point. Consider two locations, A and B, on a straight line passing through 0, and situated on opposite sides of 0 (Fig. 1). In the case of an outward scalar motion we find both A and B receding from 0 (Fig. 1(a)). On the other hand, if O's motion is vectorial we find B (or A) receding from 0, and A (or B) approaching it (Fig. 1 (b)). Thus a scalar motion gets represented as a "bivector" and not merely as a vector. The appearance of a bivectorial motion in the conventional reference system, therefore, serves to distinguish an intrinsically scalar motion from vectorial motion.

Representation of Linear Motion in the Reference System



An analogy might help to demonstrate the universality of the Law of Conservation of Direction. Imagine a long solid cylinder with a cross-sectional area of an arbitrary shape. If the cylinder is now divided into two by cutting with a plane, two new surfaces, S_1 and S_2, will be generated as the ends of the two halves of the cylinder where there were none prior to the cutting. Adopting the right hand cork-screw representation of areas, we can see that the two intersection surfaces, S_1 and S_2, will be of equal area but opposite directions (one being the mirror image of the other). The original lack of (exposed) area is substituted by two equal areas of opposite vectorial directions. It is simply not possible to carry out the intersection such that only one new surface is generated. In an identical manner, the representation in the conventional spatial reference frame of a scalar motion, with its inherent lack of direction, is not possible with the ascription of only a single direction—it requires the imputation of two mutually opposite directions, in other words, a bidirection.

Photon: an Intrinsic SHM ?

In case the representation of a scalar motion in the stationary three-dimensional reference system is rotational motion instead of translational motion, the requirement of the conservation of direction still holds good, the representation taking the form of a *birotation*. The birotation is a vectorial combination of two equal and opposite rotations, clockwise (CW) and counter-clockwise (CCW).

Some students of the RS have argued that the CW or CCW direction of rotation is the algebraic sign, the sense, of the rotation and not really a direction. Therefore they concluded that rotation has no true direction. But they are missing the point. What their conclusion means is that rotation does not have a direction in the sense of a direction of linear motion. The CW or CCW sense of rotation is relative to the axis of rotation, but the axis itself can be oriented in any direction in the three-dimensional spatial reference system. Adopting the right hand cork-screw representation of rotation, the latter can be vectorially depicted .

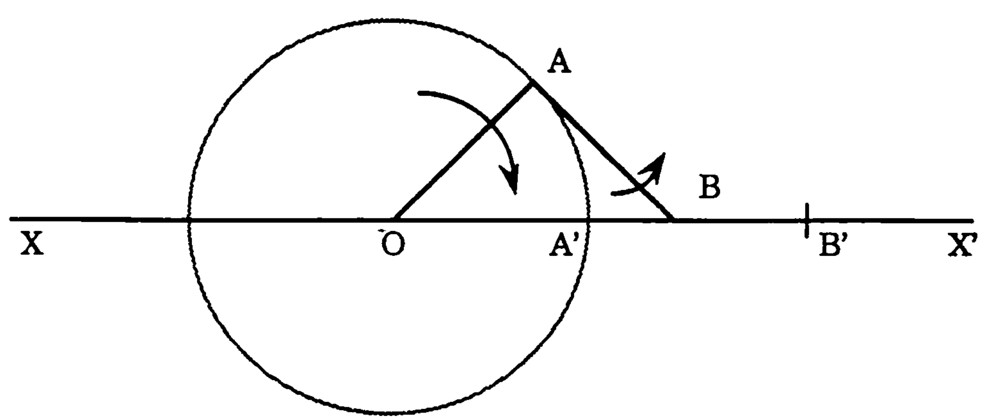
Because of the discrete unit limitation a mere change of direction (as in rotation) without any magnitude is not possible. Hence a unit of birotation involves half a unit of one-dimensional space element in each of its component rotations. As shown in Fig. 2, let one component rotation be CW, and the reference point for this rotation be O, OA being the radius of rotation with the axis of rotation perpendicular to the plane of the paper. The reference point for the second component rotation, which is CCW, will be A, with AB as radius and axis parallel to that of the first rotation. Since the angular speeds of the two rotations are of equal magnitude, the visible result of this birotation is a SHM, with location B oscillating in the XX' direction. This, therefore, is how the SHM is engendered by uniform motion—the basis of photon structure.

At this juncture it might be mentioned that, in this Paper, we are endeavoring to discuss some logical difficulties occurring in the present development of the RS and to clarify them in the light of the discovery of the Law of Conservation of Direction. It is not possible, however, to undertake here the full development of the aspects we discuss beyond supplying the missing links in the logic. It is assumed that the reader is sufficiently familiar with the account of the development of RS as given by Larson in his works.

Polarization

Suppose now that a light beam is passed through a polarizer and one of the component rotations of the photons is filtered out. The outcoming photons will be constituted of a continuous uniform rotation, with the axis of rotation lying parallel to the direction of propagation. If a blackened disk is suspended by a fine filament and is irradiated by such a circularly polarized beam of

Figure 2



Simple Harmonic Motion as Birotation

radiation such that the beam travels parallel to the suspension and strikes the disk normally, a torque should appear. This, of course, is experimentally verified. It might be noted that in Larson's account of the structure of the photon there is no explanation of this fact.

Vibration vs. Translation

Since each unit of motion, by the reciprocal postulate, consists of one unit of space in association with one unit of time, all motion takes place at unit speed. However, by a sequence of reversals of the progression of either time or space, while the other component (space or time) continues progressing unidirectionally, an effective speed other than unity can result. Explaining this, Larson gives a tabulation[2] for the example of an effective speed of 1/3 (see Table I).

Table I: DIRECTION

unit	vibration		translation	
number	*scalar*	*vectorial*	*scalar*	*vectorial*
1	inward	right	inward	forward
2	outward	left	outward	backward
3	inward	right	inward	forward
4	inward	left	inward	forward
5	outward	right	outward	backward
6	inward	left	inward	forward

Larson comes up with an explanation of a sort, which sounds more like an apology: "...in order to maintain continuity in the relation of the vectorial motion to the fixed reference system the vectorial direction continues the regular reversals at the points where the scalar motion advances to a new unit of space (or time)."[6] On the principles of probability, the alternative possibility, namely, the vectorial directional reversals occurring in unison with the scalar directional reversals appears more logical.

The present recognition of the fact that the linear vectorial vibration is really the manifested result of a birotation now clarifies the situation. Both in the case of the vibration and in the case of the translation the vectorial directional reversal is in unison with the scalar directional reversal. In the vibrational case, the two component rotations involved in the birotation do promptly reverse their respective directions at the time of the reversal of the scalar direction. However, this does not produce any effect on their vector resultant, which continues uninterrupted as the SHM.

Referring to Fig. 2, let A reach the position A' and B the position B'. This is one extreme position of the oscillation of B. From this position whether OA' continues rotate in the original CW direction or reverses and rotates in the CCW direction (with the sense of rotation of the second rotation always being opposite to that of the rotation of OA) hardly matters—in either case the observable result is the *same* oscillatory motion of B.

Conclusions

Summarizing some of the conclusions reached:

1) The representation of a scalar motion in the three-dimensional spatial reference system conserves direction by substituting bidirection for its inherent lack of direction.
2) The primary displacement from the background condition of the space-time progression takes the form of a uniform birotation, the vector resultant of which manifests as a SHM. This is identified as the photon.
3) Circular polarization is the result of filtering out one of the component rotations of the photon.

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–K.V.K. Nehru

Supernova 1987A

I have received a number of inquiries as to how well the observations of the supernova that has been observed in the Large Magellanic Cloud agree with the theoretical conclusions about supernovae in general that are expressed in *The Universe of Motion.* I cannot give a definite answer to this question as yet, since the observational data thus far reported are limited, and to some extent conflicting. However, I can give what may be considered a progress report, based on the situation as it stands in the light of the information that has appeared thus far in the publications accessible to the general public.

The Theories

The astronomers' theory of supernovae assumes that the generation of energy in the stars takes place by conversion of hydrogen to successively heavier elements, eventually resulting in an exhaustion of the hydrogen supply, and a consequent collapse of the stellar structure. The smaller stars are assumed to collapse quietly into white dwarfs, but the collapse of the larger stars (those more than about 8 times the mass of the sun) is assumed to be of such a catastrophic nature that it leads to an explosion.

Our theory asserts that the supernova explosion occurs when a star reaches one of two limits, a *mass* limit (Type I) or a limit related to *age* (Type II).

Size of Exploding Star.

The first reports of the LMC supernova indicated that the star which exploded had been identified, and was a large one. Later observations showed that this star was still intact, and no other large star at this location could be found on the pre-explosion photographs. This probably means that the explosion occurred in a small star, contradicting accepted theory.

Our findings are that *any* star can become a supernova at the appropriate stage of its development.

Intensity of Explosion

The maximum observed brightness is reported to be "faint for a supernova", and the supernova is developing much faster than expected. These observations agree with the conclusion that the exploding star was a small one.

Supernova Type

It is now generally conceded that the explosion is Type II.

Our finding is that Type II is the *only* kind of an explosion that a small star can undergo.

Chemical Composition of Products

According to the astronomers' theory of the supernova, the amount of hydrogen in the explosion products should be very small.

On the basis of our theory, the constituents of the star should be predominantly hydrogen.

So far, all that has been observed is "an envelope of luminous hydrogen."

Neutrinos

There is much excitement about the reported observation of bursts of neutrinos that apparently originate from the supernova. But the production of some neutrinos in high energy processes is a feature of all present-day theories, while no theory is firmly enough established quantitatively to yield unequivocal conclusions. The neutrino observations therefore cannot be expected to contribute significantly to a resolution of the question as to the validity of conflicting supernova theories.

Our theoretical development has not yet been extended to the neutrino production in high energy processes.

Astronomers' Reaction

As matters now stand, the astronomers are conceding that the supernova is not behaving according to their theoretical expectations. A report in the March 13 issue of "Science News" contains the following statements:

> One thing that seemed clear at the March 6 meeting is that the theorists are having a hard time assimilating the information from this, the nearest supernova since 1604.
>
> It's hard to make something dim into a type II. (Comment on indications that the original star was dim, and that the supernova is type II.)
>
> The first radio observations caused more theoretical consternation.

In contrast to these comments on the theoretical problems that the astronomers are facing, we can say that all observations thus far are entirely consistent with the supernova theory set forth in *The Universe of Motion.*

—D.B. Larson

READERS' FORUM

The Rydberg Constants

I am searching in ISUS literature for an explanation of the spectral lines. I know that Mr. Larson deduces the values of "unit s" and "unit t" from the Rydberg frequency, so that I presume that the Reciprocal System must first explain why there is a Rydberg frequency or what it is (the orthodox explanation calls for a nucleus and orbits of electrons, but that is not pertinent in the R.S.)

–Pierre Marechal, Montreal

In 1890 Johannes Robert Rydberg, a Swedish chemist, developed mathematical equations for describing the frequencies of light in various series of related spectral lines. But Rydberg did not invent the constants named after him that appear in these formulas. Rather Rydberg discovered mathematically these constants to express unknown features of the intrinsic structure of light radiation. These constants enabled D.B. Larson to estimate and measure the discreteness of motion, of time and of space and so to establish the quantitative limits of the units of motion as well as of the natural unit of space and the natural unit of time.

The two Rydberg constants of importance for this discussion are: the wave-number constant, $109{,}737 cm^{-1}$ and the frequency constant,$3.2880 * 10^{15}$ cycles per second. The first discussion of the role of the Rydberg frequency constant in the development of the R.S. is found in Dewey B. Larson's *The Structure Of The Physical Universe* (1959), pages 24-26.

The value of the Rydberg frequency constant is computed by multiplying the value of the Rydberg wave-number constant, $109{,}737 cm^{-1}$, with the speed of light, $2.997925 * 10^{10}$ cm/sec. The product is 3.2880×10^{15} cycles per second. The cycle per second has been taken in this computation as the unit of frequency. The aarlier assumption was that frequency is a function of time only ($cm^{-1} * cm/sec = 1/sec$). Larson explains that frequency nevertheless is a velocity,a ratio of *space* to time. Consequently, the natural unit of frequency is one unit of space per one unit of time. Larson explains the dimension o~ this space unit thus: "This is the equivalent of one half-cycle per unit of time rather than one full cycle,as a full cycle involves one unit in each direction." (p.25)

Keeping in mind that the velocity of light corresponds to the velocity of one unit of space per one unit of time, or unit velocity, the value of the Rydberg frequency is expressed in the Reciprocal System as $6.576 * 10^{15}$ half-cycles per second. The natural unit of time is simply the reciprocal of this Rydberg frequency, since "omitting consideration of the space term in selecting the unit of measurement has the same effect as giving it unit value."

Thus, the natural unit of time is equal to:

$1/6.576 \times 10^{15} sec^{-1}$ or $.1521 * 10^{-15}$ sec or $1.52 * 10^{-16}$ sec.

By multiplying this number by the natural unit of velocity, the natural unit of space amounts to: $(1.52 \times 10^{-16}\ sec) * (2.9979 * 10^{10} cm/sec) = 4.56 * 10^{-6} cm$.

–Frank H. Meyer

Sorry, I did not ask for these easy mathematics of the Rydberg frequency. I am trying to understand the physics, these "features of the intrinsic structure of light radiation."

1. If from the frequency R we deduce mathematically some value s (in cm.) and t (in seconds), why are we so sure they are units of the "universe" analyzed?

2. Why do we not conclude that they (s and t) are multiples of units of tthe same universe analyzed?

–Pierre Marechal

The foregoing are reasonable questions. ISUS members and Reciprocity readers who are challenged by them may wish to send to Reciprocity their views on this and related questions. The editors also invite questions about other problems arising from the application of the Reciprocal Systemto the physical universe, in order to identify areas of difficulty and focus research on them.

Zeno's Paradox

In the fifth century B.C. Zeno of Elea conceived of a thought experiment involving the motion of bodies that has become known as Zeno's paradox. In its most general formulation it points out that if one were to continuously divide the distance separating two bodies approaching one another in space, the two could never come in contact, since there would always remain some finite amount of space separating them. Similarly, if one were to continuously divide the time remaining for the two bodies in motion to meet, they could never do so, because there would always remain a finite amount of time until the expected contact. Zeno's paradox has been interpreted by some as denying the existence of motion. This would make it appear absurd. A more perceptive characterization of the paradox would be that Zeno was trying to show our intuitive understanding of motion to be fundamentally flawed. But what the commentators have missed is that Zeno is employing a philosophical technique known as reductio ad absurdum. *Zeno intended to prove that the assumption of infinite divisibility of space and time leads to absurd conclusions. The only way to resolve the paradox is to assume that the hypothesis of finite divisibility of space/time is false. The corollary of Zeno's paradox is that space/time is not infinitely divisible, because the observed existence of motion implies the existence of finite units of space/time.*

—Jan Sammer

The idea of applying the reductio *ad absurdum* to a "paradox" of this kind is sound, but what the absurdity tells us is that there is something wrong in the premises of that paradox. It does not identify the error. Of course, if space and time are not infinitely divisible, that identifies one of the things that are wrong. But there is a flaw in the premises even if space and time are infinitely divisible.

...This paradox is concerned with "two bodies approaching each other in space." In other words, we are dealing strictly with a motion. The paradox cannot be formulated in strictly static terms. In order to make contact, then, enough time must elapse to enable the moving bodies to travel the full distance at the prevailing velocity. When we analyze the premises of the paradox from this motion standpoint, we find that what we are being asked to accept is an assertion that there is something paradoxical about the fact that contact is not attained in the time required to travel some lesser distance.

—Dewey B. Larson

Publication Policy

The editors of Reciprocity welcome papers, especially from new contributors. The requirements that a contributed paper must meet in order to qualify for publication are clarified below. Editorial assistance is available in those cases where a limited amount of revision will enable a paper to meet the requirements.

As stated in the by-laws of the International Society of Unified Science, the objective of the Society is the advancement of the Reciprocal System of physical theory. This theory, as it is defined, consists of two fundamental postulates, together with everything that can be derived from those postulates by logical or mathematical processes, without introducing anything from any other source.

The unitary character of the theory, resulting from the derivation of all of its conclusions from the same set of premises, is its most essential feature. It is this status of the theory as a *general* physical theory—the only thing of its kind—that enables proof of its validity by the probability method, and enables extension of the theory into areas inaccessible to observation.

The purpose of *Reciprocity* is to contribute toward the accomplishment of the objective of the organization. Acceptance of items for publication shall therefore be determined by the following criteria:

1. All items must have relevance to the stated objective of the International Society of Unified Science.
2. Original technical articles must deal with the Reciprocal System of theory, as defined above, or aspects thereof; that is, the propositions supported must purport to be derived from the postulates of the Reciprocal System, or from previously published conclusions reached on that basis, without introducing further assumptions.
3. Arguments advanced against previously published material must be similarly based.

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